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**Luminescence properties and energy transfer processes in Tb3+and Eu3+ doped nanoscale phosphonates**

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Metal phosphonates (MPs) are a subclass of coordination polymers possessing metal ions as nodes and phosphonate-based (-PO3H2) organic linkers. In a previous conference contribution we have described our preliminary results on the morphology of nanoparticles of metal phosphonates comprising Ce, La, Nd, Eu, Gd, Tb ions and 1,4-diphosphonobenzene, their AC dielectric response as well as basic luminescence properties.[1]

In this presentation we will explore in more detail the luminescence properties of an isomorphous series of mixed-metal Tb, Eu MP nanomaterials. Luminescence spectra (λexc.=337 nm) show that substitution of Tb3+ with Eu3+ even at small concentrations (0.25%) imparts distinct Eu3+ emission bands, while further increase of Eu3+ content causes a significant quenching of Tb-related luminescence (Fig. 1a), suggesting an energy transfer process. Energy transfer from Tb matrix to Eu3+ ions is reflected in the time-resolved measurements of 5D0 → 7F2 electronic transition. Specifically, as seen in Fig. 1b for lower Eu3+ concentrations the decay component becomes clearly longer (e.g. 0.25% - 3.74 ms, 1% - 3.04 ms); an even stronger tendency is observed for the rise of luminescence (0.25% - 0.86 ms, 1% - 0.36 ms). Temperature dependence of the steady-state and time-resolved luminescence properties will be also discussed.



Fig. 1 a) Emission spectra of Tb phosphonates doped with various amounts of Eu3+. b) Luminescence decay traces of Tb phosphonates doped with various amounts of Eu3+, monitored at 5D0 → 7F2 transition (λem=612 nm).

1. *Zaręba J. K., Ciżman A., Samoć M., Nyk M.* Study on morphology, luminescence, and dielectric properties of nanoscale lanthanide phosphonates // Nanotechnology and nanomaterials (NANO 2017) Abstract Book, p. 776.